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PATENT SPECIFICATION



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365,890

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Complete Accepted: Jan. 28, 1932.

COMPLETE SPECIFICATION.

**Improvements in Cylindrical Sliding Valves.**

We, YARNALL-WARING Co., a corporation organized under the laws of the State of Pennsylvania, United States of America, doing business at 102, East Mermaid Lane, Chestnut Hill, City, and County of Philadelphia, State of Pennsylvania, United States of America, Assignees of DAVID ROBERT YARNALL, of 42, W. Upsal Street, Germantown, Philadelphia, County of Philadelphia, State of Pennsylvania, United States of America, a citizen of the United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to cylindrical sliding valve members for cylindrical sliding or so-called seatless blow-off valves.

The principal object of the invention is to construct a cylindrical sliding valve member of a cylindrical sliding or so-called seatless blow-off valve in an improved manner designed to avoid practical difficulties hereinafter referred to.

In the manufacture of the so-called "seatless" type of valves the cylindrical sliding valve member has always presented difficulty. Part of this has been the requirement that the top of the said valve member shall carry the thread for the movement thereof and part of it has been due to increasingly severe requirements for the surface of the said valve member because of the rapid increase in the pressures and corresponding temperatures of the fluids which must be handled by the valve.

It has been found very desirable to use special steels for the cylindrical sliding valve member in order to secure the advantages from hardening of the steel after it has been manufactured. The best of these steels for the purpose are of the general type of that called nitralloy, though other special steels are useful also.

These steels are hardened or "nitrogenised" or as known in America as "nitrided" by subjection for a long period of time to ammonia gas preferably

at temperatures of the order of 1000° F., giving a form of surface hardening quite similar to case hardening but better than case hardening and adapted for use upon materials to which ordinary case hardening is not applicable.

Considering nitralloy as an example merely, it is found, as is true with many other steel alloys, that the metal cannot be cast satisfactorily in units as large as the cylindrical sliding valve members require, for the reason that blow holes and soft spots appear in the castings and make them unreliable. In addition the nitralloy is approximately three times as expensive as plain steel and the waste through the loss of the castings involves considerable expense.

Because of the impracticability of forming the said valve members of nitralloy castings, forgings have been tried, but they involve difficulty in finishing which is serious with ordinary steel and which becomes prohibitive with nitralloy.

This difficulty is overcome by this invention according to which the cylindrical valve member is formed with a case hardened body portion, which may be a forging of case hardening steel, to which is united a soft steel head formed with threads for engagement with valve operating means. The body portion may be nitrogenised and the head of un-nitrogenised steel and the body and head parts are suitably united by welding.

The invention will be more fully described with reference to the example of construction shown in the accompanying drawing in which:—

Figure 1 is a sectional view of a seatless blow-off valve.

Figure 2 is a top plan view of the plug that forms the upper portion of the improved cylindrical sliding valve member.

Figure 3 is a sectional perspective view of the upper plug member, sectioned on the line 3—3 of Figure 2.

Figure 4 is a sectional perspective view of the lower plug tube or sleeve, sectioned on the line 3—3 of Figure 2.

The valve body 4 as shown in Figure 1 is bored at 5 and counterbored at 6,

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Price 25p

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forming a seat for a lower packing 7, held in place by a shell 8, here forming a liner. This liner is the effective valve interior and is apertured at 9 at the level 5 of the inlet 10 to pass the blow-off discharge. A channel 11 surrounds the liner so as to increase the cross section of the inlet flow. The outlet is shown at 12.

The upper packing 13 is pressed downwardly by a follower 14, held in place by a yoke 15, secured by suitable bolts 16 through flanges 17 and 18. A wheel 19 is united rigidly to a stem 20, which has bearing in the yoke at 21, and is prevented from longitudinal movement in any suitable manner.

The stem 20 is threaded into the plug head 22 of the cylindrical sliding valve member so as to lift and lower the plug tube or operative part of the said sliding valve member, here a rigidly attached sleeve 23, welded at 24 to the plug head 22.

The cylindrical sliding valve member is held against rotation by guides 25 traveling in projections 26 within the yoke. The sleeve is provided with openings 27 which are thus effectively openings in the valve member.

A chamfer 28 is provided at the upper end of the sleeve 23 and the plug head 22 is correspondingly chamfered at 29 to provide proper space for the welding operation. The plug head 22 has a downwardly depending sleeve 30 that is forced into the counterbore 31 in the sleeve 23. The valve member tube forging of nitralloy is first machined out and then heat-treated until it becomes very hard.

The plug head 22 of soft cast carbon steel is machined and is forced into the upper counterbored end of the tube.

It has been found that these widely different materials can be welded reliably to produce as desirable a cylindrical sliding valve member as if it were all nitralloy. 45

Though the valve shown has been described at some length in order that such illustration may be clear, it is to be understood that for the present purpose the illustration is intended to be diagrammatic rather than specific, and that there is no thought of confining the invention to this particular valve shown. 50 55

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:— 60

1. A cylindrical sliding valve member comprising a case-hardened body portion having united thereto a soft steel head in which operating threads for the valve member are formed. 65

2. A cylindrical sliding valve member in accordance with claim 1, in which the body is made of nitrogenised or nitrided steel and the head of un-nitrogenised or un-nitrided steel. 70

3. A cylindrical sliding valve member in accordance with claim 1 or claim 2, in which the body and head are united by a weld.

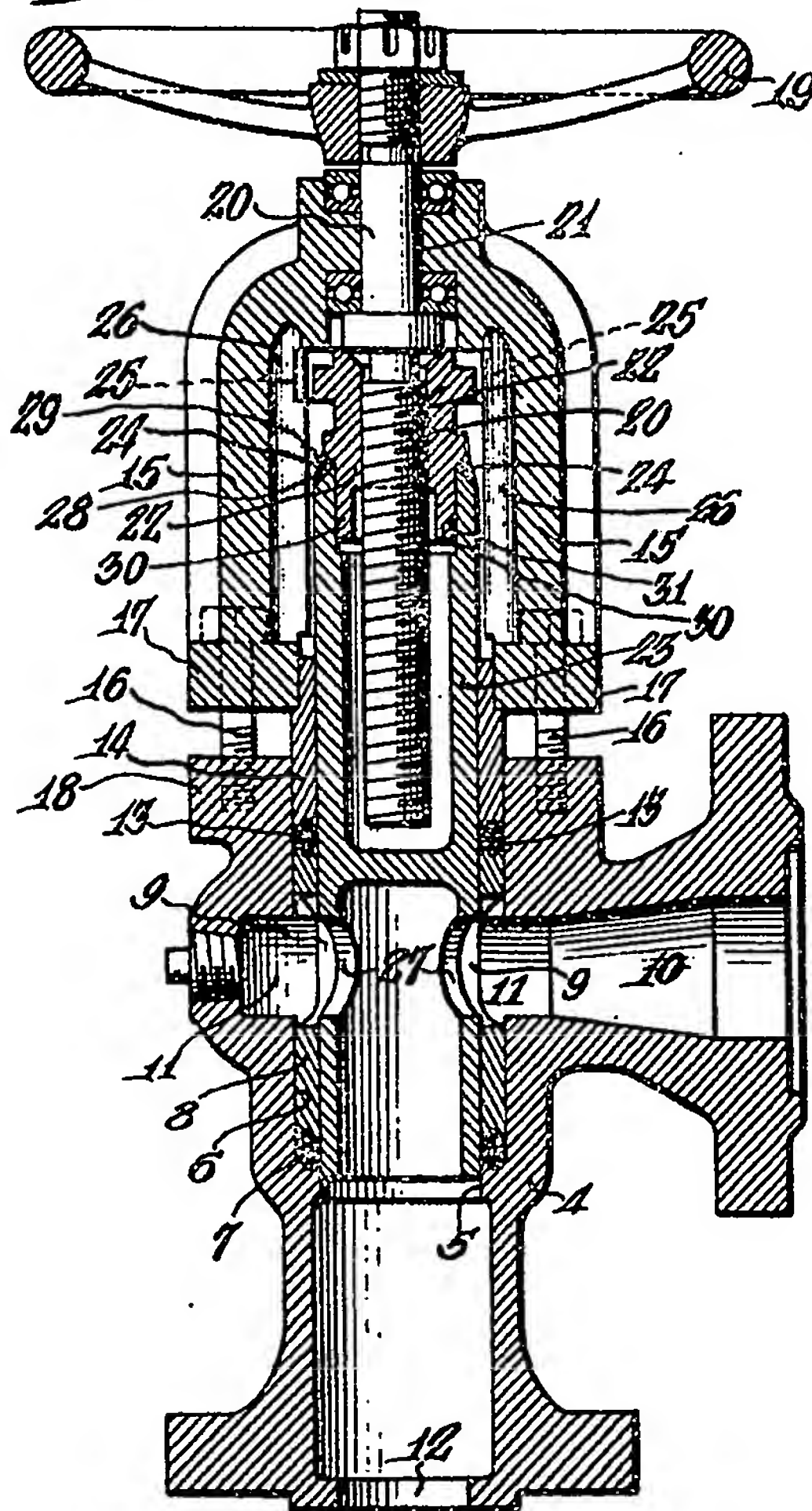
4. A cylindrical sliding valve member for so-called seatless blow-off valves constructed substantially as hereinbefore described with reference to the accompanying drawing. 75

Dated this 7th day of April, 1931.

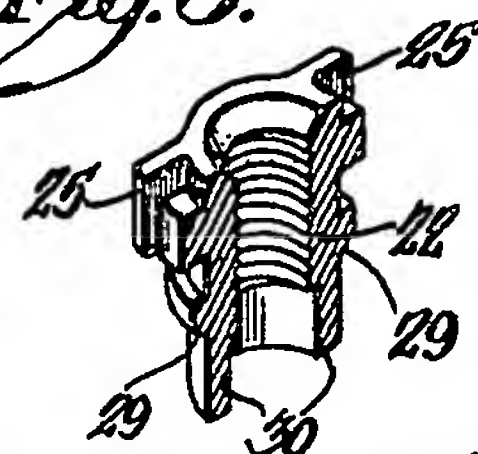
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*[This Drawing is a reproduction of the Original on a reduced scale.]*

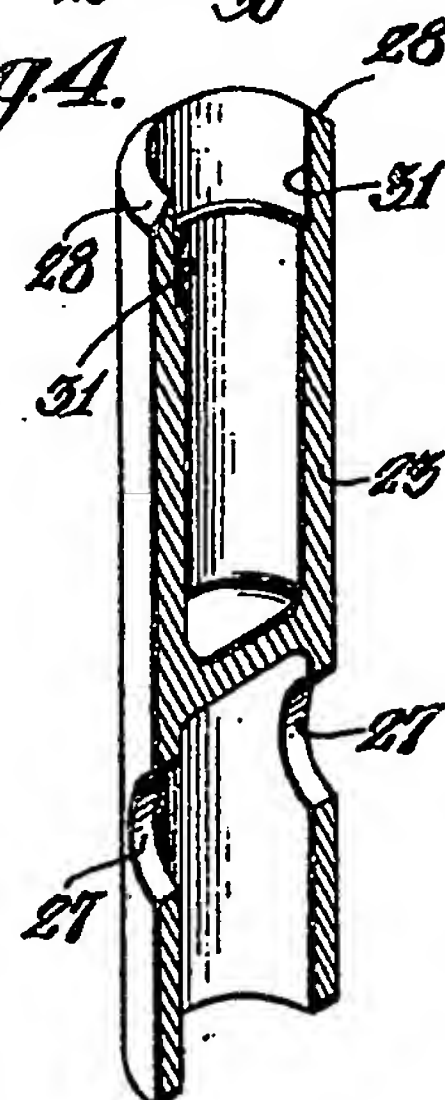
*Fig. 1.*



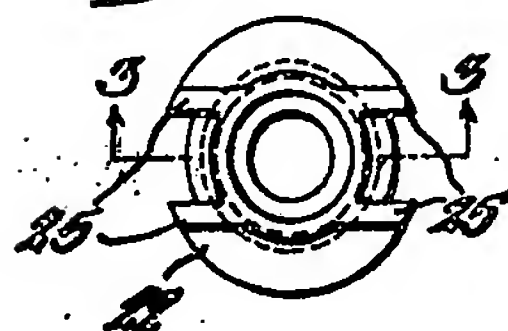
*Fig. 3.*



*Fig. 4.*



*Fig. 2.*



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